

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Rule 71.1)

To: Sobisch Peter SOBISCH & CALLIES Odastrasse 4a D-37581 Bad Gandersheim GERMANY

Date of mailing <i>(day/month/year)</i>	16.11.2004
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Applicant's or agent's file reference 954/263 WO	IMPORTANT NOTIFICATION
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International application No. PCT/EP 03/04659	International filing date <i>(day/month/year)</i> 03.05.2003	Priority date <i>(day/month/year)</i> 31.07.2002
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Applicant HEYE INTERNATIONAL GMBH

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide*.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

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PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(Article 36 and Rule 70 PCT)

Applicant's or agent's file reference 954/263 WO	FOR FURTHER ACTION	See communication on the transmittal of the international preliminary examination report (form PCT/IPEA/416)
International file reference PCT/EP 03/04659	International application date (day/month/year) 03.05.2003	Priority date (day/month/year) 31.07.2002
International Patent Classification (IPC) or national classification and IPC C03B9/193		
Applicant HEYE INTERNATIONAL GMBH		

1.	This international preliminary examination report was established by the International Preliminary Examining Authority and transmitted to the applicant according to Article 36.	
2.	This REPORT consists of a total of 5 sheets, including this cover sheet.	
	<input checked="" type="checkbox"/> The report is also accompanied by ANNEXES: these are sheets of the description, claims and/or drawings which have been amended and are the basis of this report, and/or sheets containing rectifications carried out before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions for the PCT)	
	These annexes include a total of 11 sheets.	
3.	This report contains indications relating to the following items:	
	I	<input checked="" type="checkbox"/> Basis of the report
	II	<input type="checkbox"/> Priority
	III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability.
	IV	<input type="checkbox"/> Lack of unity of invention
	V	<input checked="" type="checkbox"/> Reasoned statement under Rule 66.2 a)ii) with regard to novelty, inventive step and industrial applicability; documents and explanations supporting such statement.
	VI	<input type="checkbox"/> Certain documents cited
	VII	<input type="checkbox"/> Certain defects in the international application
	VIII	<input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 14.01.2004	Date of completion of this report 16.11.2004
Date and mailing address of the IPEA European Patent Office -P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Netherlands Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax +31 70 340 - 3016	Authorised officer Marrec, P. Tel. + 31 7 340-3793

INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

International File Reference PCT/EP 03/04659

I. Basis of the report

1. With respect to the **elements** of the international application (*replacement sheets which have been furnished to the receiving office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report because they do not contain any amendments (Rule 70.16 and 70.17))*):

Description, pages

4-6, 8 as originally filed

1-3, 3a, 7 received on 09.10.2004 with a letter dated 08.10.2004

[TRANSLATOR'S NOTE: manuscript amendments added to original text: the number 10 in these two dates is marked "incorrect" and amended to what appears to be a number 9]

Claims, no.

1-15 received on 09.10.2004 with a letter dated 08.10.2004

[TRANSLATOR'S NOTE: manuscript amendments added to original text: the number 10 in these two dates is marked "incorrect" and amended to what appears to be a number 9]

Drawings, sheets

1/6-6/6 as originally filed

2. With regard to the **language**: all the elements mentioned above were available to the Authority in the language in which the international application was filed or were filed in this language unless stated otherwise at this point.

The elements were available to the authorities in the _____ language or were filed in this language; this language is:

- ☐ the language of the translation which was filed for the purposes of the international search (according to Rule 23.1(b)).
- ☐ the language of publication of the international application (according to Rule 48.3(b)).
- ☐ the language of the translation which was filed for the purposes of the international preliminary examination (according to Rule 55.2 and/or 55.3).

3. With regard to the **nucleotide and/or amino acid sequence** disclosed in the international application the international preliminary examination has been carried out on the basis of the sequence listing which:

- ☐ is contained in written form in the international application.
- ☐ was filed together with the international application in computer-readable form.
- ☐ was filed with the Authority subsequently in written form.
- ☐ was filed with the Authority subsequently in computer-readable form.
- ☐ The statement that the written sequence listing filed subsequently does extend beyond the content of the disclosure of the international application at the time of the application has been submitted.
- ☐ The statement that the information presented in computer-readable form corresponds to the written sequence protocol has been submitted.

4. By reason of the amendments the following documents have been cancelled:

- ☐ description, pages:
- ☒ claims, no.: 16
- ☐ drawings, sheet

INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

International File Reference PCT/EP 03/04659

5. ☐ This report has been established without consideration (of some) of the amendments since, for the reasons stated, these extend, in the Authority's opinion, beyond the content of the disclosure as originally filed (Rule 70.2(c)).

(Reference is made under Point 1 to replacement sheets which contain such amendments; they are to be enclosed with this report.)

6. Any additional comments:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; documents and explanations supporting such statement.

- | | |
|-------------------------------|----------------------------------|
| 1. Statement | |
| Novelty (N) | Yes: Claims 1-15
No: Claims - |
| Inventive step (IS) | Yes: Claims 1-15
No: Claims - |
| Industrial applicability (IA) | Yes: Claims 1-15
No: Claims - |

2. Documents and statements:

See insert

With respect to Point V

**Reasoned statement with respect to novelty, inventive step and commercial applicability;
documents and explanations in support of this statement**

5 Reference is made to the following documents:

D1: US 5 411 564

D2: DE 92 12 648 U

1)

10 The document D1 is regarded as the closest prior art with respect to the subject matter of claim 1. It discloses:

Document D1 shows a pressing plunger mechanism, the pressing plungers of which are disposed so as to be moved in a reciprocating manner in the direction of their axes between an inoperative and a pressing position - in a different manner to the subject matter of the invention - by means of a piston-cylinder unit. In Fig. 2 and 3 an arrangement of a plurality of threaded spindles which extend in parallel with each other is shown, which threaded spindles are united in terms of input or driving by a gear mechanism and are operatively connected to a unitary drive. The threaded spindles are in each case engaged with threaded nuts which are connected in a non-rotatable manner to such structural elements which, in terms of the terminology of the feature combination of the current claim 1, are comparable with the first housing mentioned therein, i.e. the spindle drive shown herein serves merely for adjustment of the pressing plunger mechanism and is only functionally comparable with the second drive of the feature combination of claim 1. (cf. D1, column 19, line 1 to column 20, line 55).

25 The novelty (Article 33(2) PCT) of the subject matter of claim 1 with respect to (D1) is therefore demonstrated.

2)

30 The solution proposed for this object in claim 1 of the present application is based on inventive step for the following reasons (Article 33(3) PCT):

The subject matter of the application differs from the subject matter of reference D1 in that instead of a piston-cylinder unit as the "first drive" a mechanical drive, embodied by a spindle gear, is used, wherein an angular gear is integrated into the operational chain existing between a

threaded spindle and an electric servo motor, which angular gear contributes overall to achieving a space-saving structure since the drive can be disposed laterally. Apart from a considerable improvement in the precision of the movement control of the pressing plunger with respect to D1, in this way a structurally simpler assembly is achieved since in accordance with
5 D1 the piston-cylinder unit shown therein includes a plurality of pistons which are to be supplied with pressure media on both sides. The differences between D1 and the subject matter of the application are that a connection formed in accordance with D1 by a gear mechanism between the driven shaft of a drive and a threaded spindle is replaced by the direct connection of the driven shaft to the nut of a spindle gear.

10 Therefore in accordance with the invention a drive which differs greatly from D1 is used, wherein namely a pressure medium drive is replaced by a mechanical drive, in this case in the form of a specially adapted spindle gear. However, neither the document D1 nor D2 provides the person skilled in the art with a reference to such a change, so that with respect thereto the
15 feature combination of claim 1 is not only to be regarded as new but also as being based on an inventive step.

3)

Claims 2-15 are dependent upon claim 1 and therefore also fulfill the requirements of the PCT
20 in relation to novelty and inventive step.

DESCRIPTIONPressing plunger mechanism for a glassware forming machine

- 5 The invention relates to a pressing plunger mechanism in accordance with the preamble of claim 1.

In the case of a known pressing plunger mechanism of this type (DE 30 40 762 C2 of the applicant) the pressing plunger holders are driven by a crank gear (column 6, lines 22 and 23).

- 10 This construction is expensive and takes up a large amount of space in the glassware forming machine.

An alternative type of drive for the pressing plunger holders is known from US 5,411,564.

- These are accordingly each moved axially in a reciprocating manner by a piston-cylinder unit
15 between a pressing and an inoperative position. This pressure medium drive is supported by a first housing which is disposed so that it can be adjusted with respect to a machine frame in parallel with the longitudinal direction of the pressing plungers by means of a further drive formed as a spindle drive. This latter-named spindle drive is formed by a plurality of threaded spindles extending in parallel with each other, which are engaged with spindle nuts disposed in a
20 non-rotatable manner in a base of the said housing, which are united on the input side by a gear mechanism and which are connected to a drive. However, precise movement control with a pressure medium drive is barely possible or is only possible at great expense.

- It is the object of the invention to simplify and to render more precise the linear drive of the
25 pressing plungers while taking up a small amount of space.

This object is achieved by the features of claim 1. Compressed air in particular is considered as the compressed fluid acting upon the pistons. In this way the pressing plunger can be constantly pretensioned in the direction of its pressing position. An elastic pad is thus provided for the

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2

pressing position of the pressing plunger and effects a pressing force limitation. By means of the threaded spindle any desired axial position of the pressing plunger can be approached very precisely and rapidly. These positions are, for example, the inoperative position, the pressing
5 position and a loading position therebetween, which are all known per se. The construction height of the pressing plunger mechanism can be desirably reduced by the angular gear.

The said second drive serves for basic axial adjustment of the pressing plungers for adaptation to the glass vessels to be produced on the glassware forming machine.
10

The features of claim 2 serve for controlled movement of the pressing plunger.

In accordance with claim 3 a reliable rotary drive for the nut is obtained with a low construction height.
15

The features of claim 4 serve to simplify the structure and construction.

In accordance with claim 5 undesired opening of the coupling rings can be prevented in a simple manner.
20

By the features of claim 6 the axial position of the pressing plunger can be determined extremely precisely and by simple means. The maximum penetration depth of the pressing plunger into the glass gob in the pre-mould is of particular interest. The size of the mass of the glass gob can be determined therefrom. The positional signals can be used to regulate the gob
25 mass.

By the features of claim 7 the piston rod can be secured against rotation.

The features of claim 8 serve to simplify the construction.

The formation of the second drive in accordance with claim 9 also serves this purpose.

The same is true of the features of claim 10.

In accordance with claim 11 the basic axial adjustment of the pressing plungers achieved by the second drive can be fixed in a simple and effective manner.

The features of claim 12 are particularly advantageous in structural terms.

By means of the features of claim 13 extremely stable and precise longitudinal guidance is provided both for the traverse and also for the first housing.

In accordance with claim 14 a supply of cooling air to the pressing plungers and a supply of compressed fluid to the pistons and cylinders of the pressing plunger holders is ensured in an extremely operationally reliable and constructionally simple manner. These flowable media can be supplied in any manner to the supply pipes through the machine bed. The further conveyance of these media from the end of the telescopic pipes takes place respectively in a suitable manner via a duct system.

In accordance with claim 15 the supply and telescopic pipes are protected in a particular manner against mechanical damage and against tipping with respect to each other.

These and further features and advantages of the invention are explained in more detail hereinunder with the aid of the exemplified embodiment illustrated in the drawings in which:

Fig. 1 shows an longitudinal cross-sectional view through a pressing plunger mechanism at line I-I in Fig. 2,

Fig. 2 shows the cross-sectional view at line II-II in Fig. 1,

3a

Fig. 3 shows the cross-sectional view at line III-III in Fig. 2 on an enlarged scale,

Fig. 4 shows the upper region of Fig. 1 on an enlarged scale,

5

Fig. 5 shows essentially the view at line V-V in Fig. 4,

Fig. 6 shows the cross-sectional view at line VI-VI in Fig. 5 and

10 Fig. 7 shows the cross-sectional view at line VII-VII in Fig. 2 on an enlarged scale.

shown in Fig. 1. The piston, e.g. 58, is then displaced with its piston rod 60 against the pressure of the compressed fluid relative to the cylinder 56. In this way an effective pressing force limitation is achieved. If, on the other hand, a glass gob of excessively small mass enters the pre-mould, the pressing plunger 72 moves into its uppermost end operating position shown in Fig. 1.

If the pressing plunger 72 has to be changed, the pressing plunger holder 45, 46 can be moved upwards by the first drive 9 beyond the uppermost end operating position shown in Fig. 1 until the split ring 73 protrudes upwards out of its support cylinder 47, 48. In this axial mounting position the split ring 73 can be opened and the pressing plunger 72 can be changed. The split ring 73 is then closed and moved down into its support cylinder 47, 48.

These two states of excessively large or small glass masses of the glass gob are determined by displacement pick-ups 75 in accordance with Fig. 2. The displacement pick-ups 75 are fastened to the first housing 8 in parallel with the associated piston rod 60, 61. An actuating element 76 for the displacement pick-up 75 is screwed to the respective collar 64, 65. In this way by means of the displacement pick-up 75 electrical signals corresponding to the axial position of the associated pressing plunger 72 can be input into an evaluation circuit 77. Thus in a manner which is known per se the mass of the glass gobs can be regulated by the evaluation circuit 77.

Fig. 2 also shows that the flange 53 of the clamping device 52 is fastened on the one hand in each case by means of a screw 78 to the upper end of the guide rods 27, 28 and on the other hand with screws 79 to the head plate 54.

In accordance with Fig. 3 supply pipes 80 and 81 formed as one piece with each other are fastened in parallel with the longitudinal axis 69 (Fig. 1) to the base 32 of the second housing 31. The supply pipe 80 is supplied with cooling air for the pressing plunger 72 through the connection block 44 in the direction of an arrow 82.

CLAIMS

- 1 Pressing plunger mechanism (1) of a glassware forming machine (2),
5 having at least one pressing plunger (72) which in normal operation can be moved axially in a reciprocating manner together with a pressing plunger receiver (71),
10 having a first displaceably disposed housing (8) which supports a first drive (9),
15 having a second housing (31) which is fixed on the machine and supports a second drive (39),
wherein a piston rod (60; 61) of a piston (58; 59) is fastened to each pressing plunger receiver (71),
20 wherein each piston (58; 59) can be displaced in a cylinder (56; 57) of a pressing plunger holder (45; 46),
wherein a piston surface (74) facing away from the pressing plunger (72) is acted upon by a compressed fluid (83),
25 wherein the pressing plunger holder (45; 46) can be moved axially in a reciprocating manner between an inoperative position and a pressing position by the first drive (9),
and wherein the first housing (8) can be adjusted by the second drive (39) with respect to the second housing (31) in parallel with a longitudinal axis (69) of the at least one pressing plunger (72),
30 characterized in that
the pressing plunger holder (45; 46) is connected in a non-rotatable manner to a threaded spindle (17),

10

that a nut (21) which can be rotationally driven by the first drive (9) is engaged with the threaded spindle (17),

5 that the nut (21) is coupled to a driven shaft (15) of an angular gear (14) and

that an input shaft (13) of the angular gear (14) can be rotationally driven by an electric servo motor (10) of the first drive (9).

10 2 Pressing plunger mechanism as claimed in claim 1,

characterized in that

15 a play-free elastic coupling (12) is disposed between the electric servo motor (10) and the input shaft of the angular gear (14).

3 Pressing plunger mechanism as claimed in claim 1 or 2,

characterized in that

20 the driven shaft (15) of the angular gear (14) is disposed coaxially with the threaded spindle (17) and

25 that the driven shaft (15) has a concentric space (18) which receives a free end (16) of the threaded spindle (17) with radial clearance all around.

4 Pressing plunger mechanism as claimed in any one of claims 1 to 3,

characterized in that

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when the pressing plunger mechanism (1) has a plurality of pressing plungers (72) all pressing plunger holders (45, 46) are fastened to a common traverse (24), and

5 that the traverse (24) is connected in a non-rotatable manner to the threaded spindle (17).

5 Pressing plunger mechanism as claimed in any one of claims 1 to 4,

characterized in that

10 each pressing plunger (72) and its pressing plunger receiver (71) can be coupled to each other by a longitudinally divided split ring (73),

15 that the closed split ring (73) is supported in the radial direction by a support cylinder (47; 48),

that each support cylinder (47; 48) is fastened to the first housing (8) and

20 that the angular gear (14) and the electric servo motor (14) of the first drive (9) are also fastened to the first housing (8).

6 Pressing plunger mechanism as claimed in claim 5,

characterized in that

25 a displacement pick-up (75) is also fastened to the first housing (8) in parallel with the piston rod (60; 61),

30 that an actuating element (76) for the displacement pick-up (75) is fastened to the piston rod (60; 61), and

that by means of the displacement pick-up (75) electrical signals corresponding to the axial position of the associated pressing plunger (72) can be input into an evaluation circuit (77).

7 Pressing plunger mechanism as claimed in any one of claims 1 to 6,

characterized in that

a radially extending collar (64; 65) is fastened to each piston rod (60; 61), and

that the collar (64; 65) engages, by means of an axially parallel orifice (66), around an axially parallel pin (67) of the pressing plunger holder (45; 46).

8 Pressing plunger mechanism as claimed in claim 7,

characterized in that

the actuating element (76) for the displacement pick-up (75) is fastened to the collar (64; 65).

9 Pressing plunger mechanism as claimed in any one of claims 1 to 8,

characterized in that

on its end facing away from the at least one pressing plunger (72) the first housing (8) has a projection (34) provided with an outer thread (33),

that an inner thread (36) of an axially fixed toothed ring (37) of the second drive (39) is engaged with the outer thread (33) and

that a toothed wheel (38) of the second drive (39) meshes with the toothed ring (37).

10 Pressing plunger mechanism as claimed in claim 9,

characterized in that

the toothed wheel (38) can be rotationally driven in a reciprocating manner by a worm gear (41).

11 Pressing plunger mechanism as claimed in any one of claims 5 to 10,

characterized in that

the second housing (31) extends as far as the at least one support cylinder (47; 48) and

that each axial position of the first housing (8), which is adjusted by the second drive (39), can be fixed by a clamping device (52) which is fastened to the second housing (31) and cooperates with the at least one support cylinder (47; 48).

12 Pressing plunger mechanism as claimed in claim 11,

characterized in that

the first housing (8) is disposed inside the second housing (31).

13 Pressing plunger mechanism as claimed in any one of claims 11 or 12,

characterized in that

two guide rods (27, 28), which are disposed at a lateral spaced disposition from each other, are fastened to the second housing (31) in parallel with the longitudinal axis (69) of the at least one pressing plunger (72),

that the traverses (24) can be displaced by means of guide bushings (25, 26) on the guide rods (27, 28) and

14

that the first housing (8) can be displaced by means of guide bushings (29, 30) on the guide rods (27, 28).

5 14 Pressing plunger mechanism as claimed in any one of claims 11 to 13,

characterized in that

10 in parallel with the longitudinal axis (69) of the at least one pressing plunger (72) at least one supply pipe (80; 81) for pressing plunger cooling air (82) and for the compressed fluid (83) is fastened to a region of the second housing (31) facing away from the at least one pressing plunger (72) and

15 that a telescopic pipe (84; 85), which is fastened to the traverse (24), passes into each supply pipe (80; 81) in a sealed manner.

15 Pressing plunger mechanism as claimed in claim 14,

characterized in that

20 the at least one supply pipe (80; 81) and the at least one telescopic pipe (84; 85) are disposed between the guide rods (27; 28).